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QUARTE LY PROGRESS REPORT NO. 1A

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

for

Office of Research Grants and Contracts Code BG National Aeronautics and Space Administration

July 1962

Metallurgical Research Laboratories Department of Chemical Engineering and Metallurgy Syracuse University

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QUARTERLY PROGRESS REFORT NO. 1A (Period from April 23, 1962 to June 30, 1962)

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

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R. J. Sell, C. Chave and V. Weiss

Contract No. NASr-43 Account No. 1620.873

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

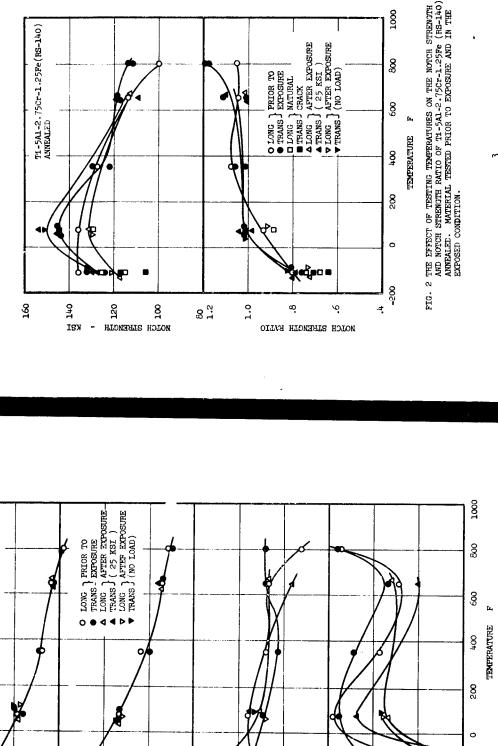
This report covers work performed during the period April 23, 1962 to enable the data herein to be available for the sixth meeting of the through the period June 30, 1962. The period reported was shortened Special Committee for Materials Research for Supersonic Transports which meets in Washington, D. C. on July 17 and 18, 1962.

(RS-120A) in the annealed condition and solution treated and aged condition notch strength ratio versus stress concentration factor for T1-5A1-4V and Republic FH 15-7 Mo in condition CH-900 and RH-1100 are presented in Data obtained during this period for T1-5Al-2.75Cr.1.25Fe (RS-140) through 4. Preliminary data on Armco PH 15-7 Wo heat number 880656, in condition CH-900 is also presented in figures 5 and 6. In addition annealed and T1-4A1-3Mo-1V (RS-115) annealed, is shown in figures 1 figures 7 and 8.

Table I shows stress concentration factor (Kt) for the various

notch root radii used.

Girld String Things To The String The String The String The String The String The To S



T1-5AL-2.75Cr-1.25Fe(RS-140) ANNEALED

ri-5al-2.75cr-1.25Fe(RS-140) Annealed

88

32

KZI

LENSIFE SLIFENCIH

888

22

8

O.2≸ YIELD STRENCTH

22

18

‡

MODULUS OF ELASTICTTY
PSI X 10-6

유큐

2

9

PERCENT

ELONGATION

1000

8

9

200

TEMPERATURE 8

m

O LONG PRIOR TO
FILONG NATURAL
FINANCS CRACK
ALONG AFTER EXPOSURE
ATRANS (25 KSI)
VONG AFTER EXPOSURE
TRANS (NO LOAD)

FIG. 1 THE EFFECT OF TESTING TEMPERATURES ON THE TEMSILE STRENGTH, THE YIELD STRENGTH, THE NOMINS OF ELASTICITY AND THE ELONGATION IN PERCENT OF T1-5A1-2.75CF-1.25Fe (FS-140)

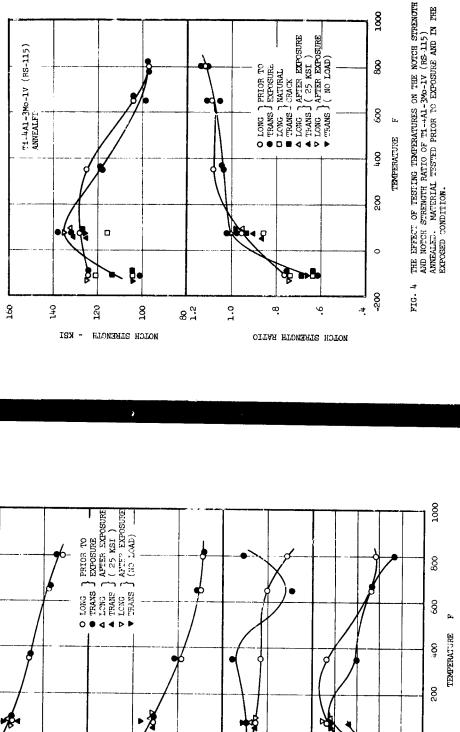


FIG. 3 THE EFFECT OF TESTING TEMPERATURES ON THE TENSILE STRENGTH, THE YIELD STRENGTH, THE MODULUS OF ELASTICITY AND THE ELONGATION IN PERCENT OF T1-4A1-3M0-1V (RS-115) ANNEALED. MATERIAL TESTED FRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

0

0

SERCENT

MOITADNOLE

5

1000

8

8

00₁

200

0

TEMPERATURE

O LONG PRIOR TO
FRANS EXPOSITE.

TRANS CARACK
TRANS CARACK
A LONG AFTER EXPOSURE
A THANS (25 KSI)
A THANS (25 KSI)
FRANS (NO LOAD)

0 • 0 • 4 • •

#1-4A1-3M0-1V (RS-115)

T1-4A1-3Mc-1V (RS 115) ANNEALET

958

3

8

LENSITE SIBENCIA

2000

150

9

KSI

O.24 YIELD STRENCTH

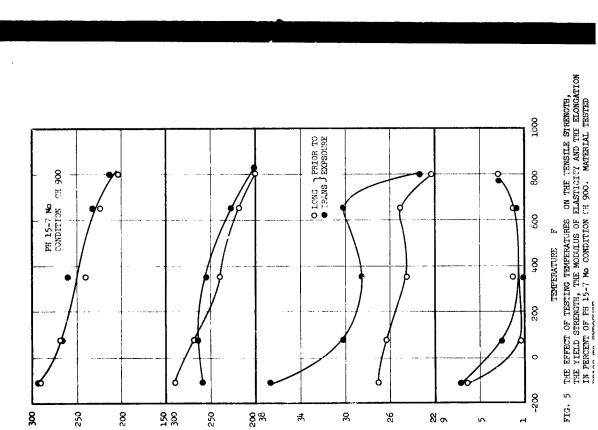
28

‡

WODDING OF ELASTICITY

22 œ 9

58



MODULUS OF ELASTICITY
O-OL X 189

NOTCH STRENGTH - KSI

260

KBI LENSITE SLHENCLH

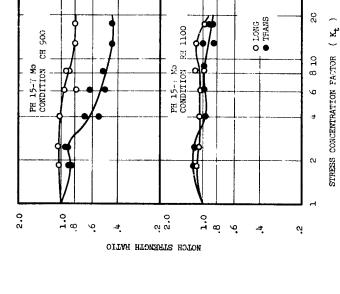
0.2≰ YIELD STRENGTH KSI

900 CH 900 PH 15-7 Mo CONDITION 600 F 400 TEMPERATURE LCNG PRIOR TO
TRANS EXPOSURE
LONG AFTER EXPOSURE
TRANS (40 KSI) FIG. 6 0 • 4 • -500 001 ထံ 220 88 977

NOTCH STRENGTH RATIO

THE EFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH STRENGTH RATIO OF PH 15-7 MO CONDITION OH 900. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

LEECENT ELONGATION ۲



T1-6A1-4V (RS-120)
SOLUTION TREATED
AND AGED

20.0

NOTCH STRENGTR RATIO

0.18

ø 4

LONG

0

T1-61-4V (RS-120A) ANNEALED

5.0

3.8

9 4

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FIG. 8 NOTCH STRENGTH RATIO VERSUS STRESS CONCENTRATION FACTOR (K.,) FOR PH 15-7 Mo IN CONDITION CH-900 AND IN CONDITION RH-1100. TESTED AT 75F. SINGLE POINT DESIGNAITES AVERAGE OF TWO TESTES. HAVING CLOSE NSR VALUES.

. .

6

8

NOTCH STRENOTH RATIO VERSUS STRESS CONCENTRATION FACTOR (Kt.) FOR TH-6A1-4V (RS-120A) IN THE ANNEALED CONDITION AND IN THE SOLVITON TREATED AND AD EDSTORMED STRONGE POINT DESIGNAINS AVERAGE OF TWO TESTS HAVING CLOSE NSR VALUES.

50

8 10

9

-4

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STRESS CONCENTRATION FACTOR (Kt)

7

FIG.

TABLE I

STRESS CONCENTRATION FACTOR (K _L)	>17.31	12.75	6.30	6.07	00.4	2.48	1.83	
NOTCH ROOT RADII	<.001	æ.	.005	010.	.025	980.	.187	